



# Lemurian Labs

*Accelerated Computing for intelligent robotics*

## Overview

We are experiencing a massive shift in how we write software, from human-driven to data-driven. Data-driven software, or software 2.0, will allow us to properly realize the true benefits of intelligent robots through the adoption of deep learning, reinforcement learning and continual learning. However, to fully realize these benefits in robotics we need a ground up reimagining of computer hardware and systems to make them data & AI centric, and deliver supercomputer level performance in the power envelope of the edge.

## Problem

Existing accelerators such as GPUs are ill-suited to the software 2.0 paradigm as well as critical tasks such as multi-modal sensor fusion, and is thereby hindering the adoption of deep learning and reinforcement learning in application areas such as robotics. Further, current systems not only suffer from the memory wall but are non-deterministic which means they cannot qualify for many of the safety standards required for safety critical industrial robotic systems.

## Solution

We are building the SPU (Spatial Processing Unit), which is a data-centric, high-performance, low-power, high-precision, deterministic, digital programmable processor.

Our SPU utilizes our novel arithmetic which has the same precision as 16 bit floating point while consuming a fraction of the silicon real-estate as well as novel on-chip compression techniques to reduce data movement by up to 80%. Our processor as a result is capable of up to 20X the performance of GPUs without sacrificing on the programmability that software engineers need.

We also use runtime verification to ensure deterministic outputs so users are guaranteed correct results every time in the same number of cycles which is essential for many safety critical applications where certifications are necessary.

## Market Opportunity

The total serviceable market for the application space we are targeting is currently \$2.6B USD, and growing to \$11.2B USD by 2031.



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## Business Model

We are a fabless semiconductor company selling our processors to robotics and system integration companies which are in line with the BoM costs of most robotics companies.

## Milestones Achieved

- Filed Patent on novel arithmetic scheme with applications to deep learning, graphics, constraint solving, AR/VR
- Secured 4 LOIs and are in early engagements with 18 more companies in our target market
- Secured seed funding of \$2.8M USD
- Built up full engineering team on software and hardware to deliver first chip

## Team

- **Jay Dawani** - CEO & co-founder | deep reinforcement learning & robotics engineer | Author of Math for Deep Learning Textbook
- **Dr. Vassil Dimitrov** - CSO & co-founder | Prof at U of Calgary | Pioneered multi-base number systems | authority on arithmetic and cryptography
- **Theodore Omtzigt**, PhD - CTO | computer architect with 30+ years experience at Intel, 3dfx Interactive, NVIDIA, IBM
- **Derek Khanna**, JD - COO | Forbes 30U30 | Ex-McKinsey & Ex-BCG
- **Dean Thrasher**, C.Dir - Exec. Chairman | 30+ years experience in the public/private sectors
- **Will Wray** - Principal SWE | 30+ years experience in compilers, system software, and numerical algorithms at HPE, BAE, Morgan Stanley, Ripple, Quansight
- **Yu-Ping Wang** - Sr ASIC Engineer | 25 years experience in ASIC design at Cirrus, National Semi, STM, Intel, SK Hynix, Agnisys
- **Silvan Kuttimalai**, PhD - Sr Compiler Engineer | Research scientist at 1QBit
- **Dr. Arjuna Madanayake** - Lead ASIC Engineer | Prof at FIU
- **Viduneth Ariyaratna**, PhD - Sr ASIC Engineer
- **Nilan Udayanga**, PhD - Sr ASIC Engineer
- **Abarajithan Ganeswaran** - ASIC Engineer
- **Justin Wright-Eakes** | Principal at Oval Park Capital | Board Member
- **Tarun Verma** | Managing partner at Silicon Catalyst | Board Observer